IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): D et al.
Docket No.: 1-4-2-1-3
Serial No.: 10/620,044
Filing Date: July 15, 2003
Group: 2616
Examiner: Pawaris Sinkantarakorn

Title: Extensible Traffic Generator for Synthesis of Network Data Traffic

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APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants (hereinafter "Appellants") hereby appeal the final rejection dated July 9, 2008 of claims 1-11 and 14-21 of the above-identified application.

REAL PARTY IN INTEREST

The present application is assigned of record to Agere Systems Inc. On April 2, 2007, the assignee Agere Systems Inc. completed a merger with LSI Logic Corporation, with the resulting entity being named LSI Corporation. LSI Corporation is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences.

STATUS OF CLAIMS

The present application was filed on July 15, 2003, with claims 1-19. Claims 20 and 21 were added in a previous amendment. Claims 1-21 are currently pending. Claims 1 and 18-21 are the independent claims.

Claims 20 and 21 are rejected under 35 U.S.C. §101.

Claims 1-10 and 14-19 are rejected under 35 U.S.C. §102(e).

Claim 11 is rejected under 35 U.S.C. §103(a).

Claims 12 and 13 are indicated as containing allowable subject matter.

Claims 1-11 and 14-21 are appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method of generating data traffic in a traffic generator, the method comprising the steps of generating a plurality of traffic flows and associating each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator. At least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith. The traffic flows comprise respective test traffic flows synthesized within the traffic generator.

As described in the specification at, for example, page 6, lines 19-28, an exemplary method of generating data traffic in a traffic generator (e.g., 100 in FIG. 1) comprises the steps of generating a plurality of traffic flows (e.g., 200 in FIG. 2) and associating each of the traffic flows with at least one of a plurality of output interfaces (e.g., 202-1, 202-2 and 202-3 in FIG. 2) of the traffic generator. As described in the specification at, for example, page 7, lines 4-9, at least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith; see also FIG. 2, in which each of output interfaces 202-1, 202-2 and 202-3

have one or more traffic flows associated therewith and output interface 202-1 has three traffic flows associated therewith. As described in the specification at, for example, page 6, lines 13-21, the traffic flows comprise respective test traffic flows synthesized within the traffic generator.

Independent claim 18 is directed to an apparatus for generating data traffic. The apparatus comprises an information processing device having a processor and a memory. The information processing device implements a traffic generator operative to generate a plurality of traffic flows and to associate each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator. At least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith. The traffic flows comprises respective test traffic flows synthesized within the traffic generator.

As described in the specification at, for example, page 5, lines 10-13, an exemplary apparatus for generating data traffic comprises an information processing device having a processor and a memory, and the information processing device implements a traffic generator (e.g., 100 in FIG. 1). As described in the specification at, for example, page 6, lines 19-28, the traffic generator is operative to generate a plurality of traffic flows (e.g., 200) and to associate each of the traffic flows with at least one of a plurality of output interfaces (e.g., 202-1, 202-2 and 202-3 in FIG. 2) of the traffic generator. As described in the specification at, for example, page 7, lines 4-9, at least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith; see also FIG. 2, in which each of output interfaces 202-1, 202-2 and 202-3 have one or more traffic flows associated therewith and output interface 202-1 has three traffic flows associated therewith. As described in the specification at, for example, page 6, lines 13-21, the traffic flows comprise respective test traffic flows synthesized within the traffic generator.

Independent claim 19 is directed to an article of manufacture comprising a computer-readable medium encoded with computer executable instructions for use in generating data traffic in a traffic generator. When executed, the computer executable instructions implement

the steps of generating a plurality of traffic flows and associating each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator. At least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith. The traffic flows comprising respective test traffic flows synthesized within the traffic generator.

As described in the specification at, for example, page 5, lines 20-25, an exemplary article of manufacture comprises a computer-readable medium encoded with computer executable instructions for use in generating data traffic in a traffic generator (e.g., traffic generator 100 in FIG. 1). As described in the specification at, for example, page 6, lines 19-28, when executed, the computer executable instructions implement the steps of generating a plurality of traffic flows (e.g., 200 in FIG. 2) and associating each of the traffic flows with at least one of a plurality of output interfaces (e.g., 202-1, 202-2 and 202-3 in FIG. 2) of the traffic generator. As described in the specification at, for example, page 7, lines 4-9, at least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith; see also FIG. 2, in which each of output interfaces 202-1, 202-2 and 202-3 have one or more traffic flows associated therewith and output interface 202-1 has three traffic flows associated therewith. As described in the specification at, for example, page 6, lines 13-21, the traffic flows comprise respective test traffic flows synthesized within the traffic generator.

Independent claim 20 is directed to an article of manufacture comprising a computer-readable storage medium encoded with one or more data structures. The one or more data structures comprise information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header. The global header comprises a clock speed field indicating a clock speed of an associated output interface.

As described in the specification at, for example, page 12, lines 13-16, an exemplary article of manufacture comprises a computer-readable storage medium (e.g., traffic file memory 104) encoded with one or more data structures. As described in the specification at, for example, page 11, lines 15-21, with reference to FIG. 3A, the one or more data structures comprise

information characterizing one or more traffic flows (e.g., 200 in FIG. 2) associated with at least one traffic generator (e.g., 100 in FIG. 1), represented as a string which includes a global header followed by one or more frames each having an associated frame header. As described in the specification at, for example, page 11, lines 26-28, with reference to FIG. 3B, the global header comprises a clock speed field indicating a clock speed of an associated output interface.

Independent claim 21 is directed to an article of manufacture comprising a computer-readable storage medium encoded with one or more data structures. The one or more data structures comprise information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header. A given one of the frame headers comprises a timing field indicating a time gap in clock cycles between the corresponding frame and a previous frame.

As described in the specification at, for example, page 12, lines 13-16, an exemplary article of manufacture comprises a computer-readable storage medium (e.g., traffic file memory 104 in FIG. 1) encoded with one or more data structures. As described in the specification at, for example, page 11, lines 15-21, with reference to FIG. 3A, the one or more data structures comprise information characterizing one or more traffic flows (e.g., 200 in FIG. 2) associated with at least one traffic generator (e.g., 100 in FIG. 1), represented as a string which includes a global header followed by one or more frames each having an associated frame header. As described in the specification at, for example, page 12, lines 6-9, with reference to FIG. 3C, a given one of the frame headers comprises a timing field indicating a time gap in clock cycles between the corresponding frame and a previous frame.

Illustrative embodiments of the present invention provide a number of significant advantages over conventional arrangements. As discussed in the specification at, for example, page 12, line 23, to page 13, line 2, illustrative embodiments of the present invention provide traffic generators having a high degree of configuration flexibility, thereby overcoming the drawbacks associated with conventional traffic generators. Advantageously, an illustrative embodiment of the present invention avoids the need for multiple customized traffic generators or the construction of elaborate prototypes, thereby considerably reducing the costs associated

with communication system design testing and other traffic generation applications. The traffic file format aspects associated with illustrative embodiments of the present invention eliminate the need for replacement of hardware traffic generators as distribution, traffic and protocol models change over time.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 20 and 21 are rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter.

2. Claims 1-10 and 14-19 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0012141 (hereinafter "Gerrevink").

3. Claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Gerrevink.

ARGUMENT

1. Rejection of claims 20 and 21 under §101

Appellants note that claims 20 and 21 each recite an article of manufacture comprising a computer-readable storage medium encoded with one or more data structures comprising information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header.

The Examiner argues that claims 20 and 21 are non-statutory because "one or more data structures is nonfunctional descriptive material because the one or more data structures are mere arrangement of data." Appellants respectfully disagree.

The portion of MPEP 2106.01 cited by the Examiner states (with emphasis added) that whereas a "mere arrangement of data" is nonfunctional descriptive material, a "data structure. . . . which impart[s] functionality when employed as a computer component" is functional descriptive material. MPEP 2106.01 further specifies "a physical or logical relationship among data elements, designed to support specific data manipulation functions," is a data structure and thus functional descriptive material.

Appellants respectfully submit that the data structures recited in claims 20 and 21, which comprise information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header, define a "physical or logical relationship among data elements, designed to support specific data manipulation functions."

As described in the present specification at page 6, lines 8-11, illustrative embodiments of the claimed data structures "provide a particularly efficient mechanism for specifying a wide variety of different types of traffic, without undue limitation as to number of protocols, size or arrival time distribution models, parameter sequences, or other features." As such, the data structures recited in claims 20 and 21 "impart functionality when employed as a computer component," and are hence functional descriptive material.

Appellants note that MPEP 2106.01 specifically indicates that "a claimed computer-readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components [of the computer which reads the medium] which permit the data structure's functionality to be realized, and is thus statutory." See also *In re Beauregard*, 53 F.3d 1583; 35 USPQ2d 1383 (Fed. Cir. 1995); *In re Lowry*, 32 F.3d 1579, 32 USPQ2d 1031 (Fed. Cir. 1994).

In the Advisory Action dated October 7, 2008 (hereinafter "the Advisory Action"), at page 2, first paragraph, the Examiner argues that the "claimed data structures, alone, cannot provide any result without being executed. The claims merely recite the format of the data structures without any practical application."

It appears that the Examiner is relying on the "useful, concrete and tangible result" test described in MPEP 2106. Appellants initially note that this test is applicable only to process claims, rather than the Beauregard claims at issue, and moreover has been recently repudiated by the Federal Circuit. See *In re Bilski*, 88 USPQ2d 1385, 1395 & n.19 (Fed. Cir., Oct. 30, 2008) ("[W]e also conclude that the 'useful, concrete and tangible result' inquiry is inadequate and reaffirm that the machine-or-transformation test outlined by the Supreme Court is the proper test to apply. As a result, those portions of our opinions in *State Street* and *AT&T* relying solely on a 'useful, concrete and tangible result' analysis should no longer be relied on.")

Accordingly, claims 20 and 21 recite statutory subject matter, namely, a computer-readable medium encoded with functional descriptive matter comprising one or more data structures which provide such significant benefits as increased efficiency.

Appellants further note that there are no prior art rejections of claims 20 and 21. Moreover, Appellants respectfully submit that claims 20 and 21 include limitations similar to those recited in allowable claims 12 and 13, respectively. As such, claims 20 and 21 are also believed to be allowable over the prior art.

2. Rejection of claims 1-10 and 14-19 under §102(b) over Gerrevink

Claims 1-10, 14-16, 18 and 19

Appellants initially note that the Federal Circuit has recently reiterated that "unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. §102." *Net MoneyIN Inc. v. VeriSign Inc.*, 545 F3d 1359, 88 USPQ2d 1751, 1760 (Fed. Cir., October 20, 2008)

Independent claim 1 includes a limitation wherein at least one of a plurality of output interfaces of the traffic generator has two or more of the traffic flows associated therewith. An illustrative embodiment is shown in FIG. 2, in which each of output interfaces 202-1, 202-2 and 202-3 have one or more traffic flows associated therewith and output interface 202-1 has three traffic flows associated therewith.

The Examiner argues that these limitations are met by paragraphs [0031], [0052] and [0077] of Gerrevink, which the Examiner characterizes as teaching that "a set of addresses is programmed to be routed to that output port, meaning that a plurality of traffic streams are associated with each output port."

Appellants respectfully submit that the output ports described in the relied-upon portions of Gerrevink are not output interfaces of a traffic generator, as recited in claim 1, but rather output ports of a device under test. See, e.g., Gerrevink at [0031] ("multiple output ports of the [System Under Test] SUT") and at [0052] ("each output port of the equipment under test").

The Examiner argues that "the SUT is a component in the Test System 100, and the Test System is interpreted as the traffic generator." Appellants respectfully submit that the SUT is a separate component which is connected to a traffic generator, rather than being a component of the traffic generator itself.

See Gerrevink at paragraphs [0036] and [0037] (with reference numerals omitted):

> The departure scheduler drives a traffic generator, which produces the resultant output data stream for transmission to the equipment under test.
>
> The traffic generator produces data packets for each of the output data streams and releases the generated packets into these streams at a time designated by the departure scheduler. An equipment specific interface may optionally be provided to interconnect the traffic generator to the equipment under test or the data communication medium. The equipment specific interface functions to provide the physical interconnection as well as the protocol conversion necessary to enable the traffic generator output to be presented to the equipment under test.

Moreover, even if the output ports of Gerrevink could be characterized as output interfaces of a traffic generator, Appellants respectfully submit that Gerrevink's alleged teachings that a set of addresses may be programmed to be routed to a given output port do not mean that a plurality of traffic streams are associated with at least one output interface, as recited in claim 1, much less that a plurality of traffic streams are associated with each output port, as alleged by the Examiner.

Appellants respectfully submit that Gerrevink explicitly defines a "traffic stream" in paragraph [0016] thereof: "Within this context, a traffic stream consists of a set of packets transmitted by one port that have a set of destination addresses corresponding to the set of networks (or routes) reachable at a particular output port." (emphasis added) As such, Gerrevink's alleged teachings that a set of addresses may be programmed to be routed to a given output port instead indicate that that port is associated with one traffic stream. This single traffic stream comprises a set of packets transmitted by that port that have a set of destination addresses associated therewith.

Accordingly, Gerrevink fails to disclose at least the limitation of claim 1 wherein at least one of a plurality of output interfaces of the traffic generator has two or more of the traffic flows associated therewith.

Independent claims 18 and 19 include limitations similar to those of independent claim 1 and are thus believed to be patentable for at least the reasons identified above with regard to claim 1.

Dependent claims 2-10 and 14-16 are believed to be patentable for at least the reasons identified above with regard to claim 1.

Claim 17

In addition to being allowable because of its dependency from independent claim 1, dependent claim 17 defines separately patentable subject matter. Claim 17 recites a limitation wherein the traffic generator is implemented primarily in software and is configured to generate data traffic files that are utilizable in another traffic generator implemented primarily in hardware.

The Examiner apparently contends that this limitation is disclosed by paragraphs 34 and 36 of Gerrevink, which state that:

> [0034] The test box 110 includes a processor 105 for executing program instructions, a graphical user interface (GUI) program 130 for interaction with a user (e.g., a test equipment operator), and a plurality of buttons 138 for allowing the user to provide input. . . .
>
> [0036] The data generation is managed in the test box 110 by the use of an interdeparture queue 101, which functions to store data representative of at least one selected traffic model, comprising both a pattern of data traffic and a traffic load. A traffic model is selected for each of a plurality of input streams, and multiple different traffic models can be concurrently supported. A departure scheduler 102 reads this stored data out of the lists maintained by the interdeparture queue 101 to identify the temporal relationships of data outputs among the plurality of input data streams. The departure scheduler 102 identifies the desired time of departure of each data packet as well as the selected stream from which the data packet originates. The departure scheduler 102 drives a traffic generator 103, which produces the resultant output data stream for transmission to the equipment under test 106.

Appellants have reviewed the relied-upon portions of Gerrevink, and have found no disclosure of the limitation at issue wherein the traffic generator is implemented primarily in software and is configured to generate data traffic files that are utilizable in another traffic generator implemented primarily in hardware. Instead, the relied-upon portion of Gerrevink discloses an arrangement with a single "traffic generator 103, which produces the resultant output data stream for transmission to the equipment under test 106." As heretofore discussed, the equipment under test is not a traffic generator. Hence, Gerrevink clearly fails to meet the limitations of dependent claim 17.

3. Rejection of claim 11 under §103(a) over Gerrevink

Dependent claim 11 includes a limitation wherein a traffic file is represented as a string which includes a global header followed by one or more frames each having an associated frame header. In formulating the rejection of claim 11 in the present Office Action, the Examiner concedes that Gerrevink fails to disclose this limitation of claim 11. Rather, the Examiner asserts that "it is well known in the art that the global header is followed by frames wherein each frame has a frame header. Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement a global header followed by one or frames each having an associated frame header."

Even if one were to accept the Examiner's assertion that "it is well known in the art that the global header is followed by frames wherein each frame has a frame header," there is no teaching or suggestion directed to the limitation of claim 11 wherein a traffic file is represented as a string which includes a global header followed by one or more frames each having an associated frame header.

Moreover, Appellants respectfully submit that, even if the Examiner could somehow establish that all aspects of the invention recited in claim 11 were individually known in the art, such arguments are insufficient to establish a *prima facie* case of obviousness. See, e.g., *KSR International Co. v. Teleflex Inc.*, 127 SCt 1727, 1741, 82 USPQ2d 1385, 1396 (U.S. 2007) ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.")

Specifically, the Examiner must provide an explicit "reason to combine the known elements in the fashion claimed by the patent at issue." *Id.* Here, the Examiner argues that the "motivation for implementing a global header followed by one or more frames each having an associated frame header is that it allows consistency in the system because every frame complies with the global header."

Appellants respectfully submit that, even if one accepts this contention, the Examiner has nonetheless failed to provide any explicit reason why one skilled in the art would have found it obvious to have represented a traffic file as a string which includes a global header followed by one or more frames each having an associated frame header, as recited in claim 11.

Rather, the proffered motivation appears to be a conclusory statement of the type ruled legally insufficient by the both Supreme Court and the Federal Circuit. See *KSR*, 127 S.Ct. at 1741, 82 USPQ2d at 1396, quoting *In re Kahn*, 441 F. 3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.").

In the Advisory Action at page 2, last paragraph, the Examiner cites column 1, lines 46-49, of U.S. Patent No. 6,178,456 (hereinafter "Zhou"), as providing documentary evidence regarding the Examiner's aforementioned assertion that "it is well known in the art that the global header is followed by frames wherein each frame has a frame header." The relied-upon portion of Zhou discloses that in "ATM communication systems, transmissions typically include a large, global header followed by a series of frames, each having its own header address for the data transmitted in the frame."

Even assuming arguendo that Zhou's disclosure of a transmission including a "global header followed by a series of frames, each having its own header address for the data transmitted in the frame" could be analogized to the limitation of claim 11 wherein a global header is followed by one or more frames each having an associated frame header (i.e., that the header address disclosed by Zhou could be analogized to the frame header recited in claim 11), there remains no teaching or suggestion directed to the limitation of claim 11 wherein a traffic

file is represented as a string which includes a global header followed by one or more frames each having an associated frame header.

Moreover, the Examiner argues that "the motivation for generating a data stream comprising a large, global header followed by a series of frames, each having its own header address for the data transmitted in the frame is that it allows inter-subnet transmission utilizing the global address in the global header." Appellants initially note that, rather than teaching that the cited transmission format "allows inter-subnet transmission utilizing the global address in the global header," Zhou in fact teaches away from the use of the cited transmission format.

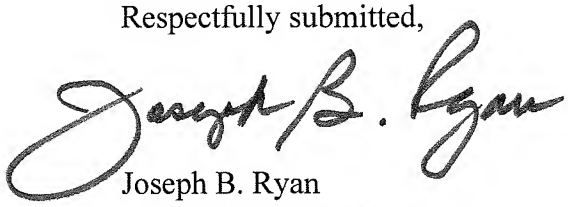
See Zhou at column 1, lines 49-54 ("The address and control information in the global header alone occupies approximately 10% of the channel capacity. Where unnecessary to achieve communication between network devices, carrying the address and control information results in inefficient communication and data transfer between network devices.")

Furthermore, even if Zhou did in fact suggest that "the motivation for generating a data stream comprising a large, global header followed by a series of frames, each having its own header address for the data transmitted in the frame is that it allows inter-subnet transmission utilizing the global address in the global header," it should be noted that the illustrative embodiment described in the specification at page 11, lines 15-28, with reference to FIGS. 3A and 3B, the global header does not include a global address. Accordingly, the proffered motivation clearly would not have led one having skill in the art to implement the claimed arrangement which need not include a global address in the global header, and thus includes embodiments which do not "allow[] inter-subnet transmission utilizing the global address in the global header."

Thus, even assuming that it were possible to have combined Gerrevink and Zhou to reach the limitations of claim 11, the Examiner's proffered motivation for doing so is deficient, especially in view of the explicit teaching away found in the Zhou reference. As recently noted by the Supreme Court, "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *KSR*, 82 USPQ2d at 1395 (citing *United States* v. *Adams*, 383 U.S. 39, 51-52, 148 USPQ 479, 484 (1966)).

In view of the above, Appellants believe that claims 1-21 are in condition for allowance, and respectfully request the withdrawal of the present rejections.

Respectfully submitted,



Date: December 9, 2008

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CLAIMS APPENDIX

1. A method of generating data traffic in a traffic generator, the method comprising the steps of:

generating a plurality of traffic flows; and

associating each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator such that at least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith;

the traffic flows comprising respective test traffic flows synthesized within the traffic generator.

2. The method of claim 1 wherein at least one of the traffic flows is generated based on user selection of at least one of a protocol encapsulation, a packet size distribution model, a packet arrival time distribution model, a traffic model, and a packet payload description.

3. The method of claim 1 wherein the output interfaces are associated with an output interface bus of the traffic generator.

4. The method of claim 3 wherein the output interface bus is implemented as a software module representative of one or more physical connections.

5. The method of claim 1 wherein each of the plurality of traffic flows maps to one of the output interfaces of the traffic generator and to an input interface of the traffic generator.

6. The method of claim 1 wherein the traffic generator is operable in at least two phases, including a first phase in which a timestamp table is constructed based at least in part on user-selected configuration information, and a second phase in which packets are generated using the timestamp table constructed in the first phase.

7. The method of claim 1 wherein the traffic generator comprises a pattern generator having a plurality of user-selectable pattern generation processes associated therewith, at least a given one of the processes generating a configuration list.

8. The method of claim 1 wherein the traffic generator comprises a sequencer having a plurality of user-selectable sequencing processes associated therewith, a given one of the sequencing processes specifying an order of selection of items from a configuration list.

9. The method of claim 8 wherein the plurality of sequencing processes comprises a group sequencer which provides a correlative mapping between two or more configuration lists and their associated parameters.

10. The method of claim 1 wherein information characterizing one or more of the traffic flows is stored as a traffic file in a memory associated with the traffic generator.

11. The method of claim 10 wherein the traffic file is represented as a string which includes a global header followed by one or more frames each having an associated frame header.

12. The method of claim 11 wherein the global header comprises a type field indicating a type of traffic description used, and a clock speed field indicating a clock speed of the associated output interface.

13. The method of claim 11 wherein a given one of the frame headers comprises a flow identification field which identifies one or more traffic flows associated with the corresponding frame, a timing field indicating a time gap in clock cycles between the corresponding frame and a previous frame, and a length field indicating the length of the corresponding frame.

14. The method of claim 1 wherein the traffic generator comprises a hardware traffic generator.

15. The method of claim 1 wherein the traffic generator comprises a software traffic generator.

16. The method of claim 1 wherein the traffic generator comprises an element of a software-based development tool for simulating the operation of an electronic system.

17. The method of claim 1 wherein the traffic generator is implemented primarily in software and is configured to generate data traffic files that are utilizable in another traffic generator implemented primarily in hardware.

18. An apparatus for generating data traffic, the apparatus comprising an information processing device having a processor and a memory, the information processing device implementing a traffic generator operative:

to generate a plurality of traffic flows; and

to associate each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator such that at least two of the plurality of output interfaces each has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith;

the traffic flows comprising respective test traffic flows synthesized within the traffic generator.

19. An article of manufacture comprising a computer-readable medium encoded with computer executable instructions for use in generating data traffic in a traffic generator, which when executed implement the steps of:

generating a plurality of traffic flows; and

associating each of the traffic flows with at least one of a plurality of output interfaces of the traffic generator such that at least two of the plurality of output interfaces each

has one or more of the traffic flows associated therewith and at least one of the plurality of output interfaces has two or more of the traffic flows associated therewith;

the traffic flows comprising respective test traffic flows synthesized within the traffic generator.

20. An article of manufacture comprising a computer-readable storage medium encoded with one or more data structures comprising information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header, wherein the global header comprises a clock speed field indicating a clock speed of an associated output interface.

21. An article of manufacture comprising a computer-readable medium encoded with one or more data structures comprising information characterizing one or more traffic flows associated with at least one traffic generator, represented as a string which includes a global header followed by one or more frames each having an associated frame header, wherein a given one of the frame headers comprises a timing field indicating a time gap in clock cycles between the corresponding frame and a previous frame.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None